

dieting. He continued to feel well in all respects, and wrote me May 30th that he then weighed 296. He was adhering to the diet and expected to get down to 250.

This case is included in these reports merely to show how excessive three hearty meals a day must be, when such a giant could remain active and well on scarcely one-third the amount, and therefore that it is eminently practicable and safe in treating our arteriosclerotic patients to spare their hearts, kidneys and digestive organs by restricting their diet very much more than is commonly done, especially when they are above their normal weight and are leading sedentary lives, or when their activities are greatly restricted as they should be.

While preparing this article I have come across a paper by Prof. Glax\*, in which he reported a very striking case of arteriosclerosis with marked cardiac insufficiency, rescued from a desperate condition by reducing the daily ingestion of liquids from 1900 ccm to 760 ccm, after a bold use of digitalis and other remedies had failed. The amount of urine, which had been 840 ccm, or upwards of 1000 ccm less than the intake, continued to be 820 ccm or 60 ccm more than the daily intake, so that the dropsy and with it the dyspnea and other serious symptoms were soon relieved. It is probable that in my Case II a reduction of the liquids ingested in addition to that of the solids would enable the patient to bring his still excessive weight down to below 200 pounds with a further improvement in his cardiac condition.

It remains to speak of climatotherapy in arteriosclerosis. Climate can help much in the treatment. Moderate warmth and dryness promote the action of the skin, and joined with equability afford the arteriosclerotic the most favorable external conditions for attaining a high old age in spite of his disabilities. Many places in our great Southwest suit well, especially for the winter months.

When the patient can live all the year round in such a comparatively dry and equable climate as that of Southern California, at nearly the sea level, his chances for improvement will be greatly increased. This is especially true for the more favored localities of that region near the coast, though as a rule not directly on the seashore. The blood pressure is not disturbed in this region either by altitude or by violent storms, cold waves or extreme changes of temperature, such as prevail so much of the time in many parts of our country.

For patients who are difficult to control or whose environment is unfavorable from whatever cause, and especially for advanced cases in which the heart unaided is no longer equal to the task of maintaining the circulation, sanatorium treatment in a good climate, with sometimes a Weir Mitchell rest-cure, offers the best possible remedy. In this way only can a suitable hygienic and mechanical treatment by diet, massage, resisted movements, baths, including in appropriate cases the Nauheim baths, electricity, etc., be systematically carried out.

\* Read before the Section on Int. Med. of the 66th deutscher Naturforscher und Aerzte in Wien.

## GENITO-URINARY TUBERCULOSIS.\*

By THOS. J. CLARK, M. D., Oakland.

A more intimate study of the conditions brought about through the invasion of the genital and urinary organs by the tubercle bacillus in the few years passed has placed before us a knowledge of the problems involved, so that we may go about the management of these cases in a more orderly fashion and also with better assurance of the outcome for the patient.

Here, as in other tuberculous conditions, an early recognition of the symptoms and a confirmation of the diagnosis by the finding of the tubercle bacillus or a demonstration through animal inoculation, takes away a large part of the handicap that formerly prevailed against the workers.

Through the use of the cystoscope we have vision to aid us in the differentiation of bladder problems, and by taking the urine directly from each ureter, we may find the variations that occur in each kidney so far as the functional capacity is concerned, and also what destructive action either side is sustaining, so placing us in a better position in deciding the advisability of removing a kidney with its dangerous source of infection to other structures.

Purposely the kidney is mentioned for from the gathered statistics it has been found that these organs are usually the first to become the harboring point of tubercle in the urogenital system and the epididymis takes second place in this initiative, and later the infection may spread to other portions of the tract through the channels to the bladder and posterior urethra, being comparable to infection through the sputum of the upper respiratory tract following lung foci. Bladder involvement early has been found to occur in about one-third of the cases where a tuberculous kidney exists, but rather rarely with a diseased epididymis, whereas primarily the kidney is so seldom diseased in this way as to be negligible; only one case so far having been reported.

Is tuberculosis of these organs a frequent occurrence and how often are they the first centers of the process in the body?

Considering the excretory function of the kidneys and the favorable opportunity for organisms to pass from the single layered vessels of the glomeruli, it is strange they are not more often involved, for tubercle bacilli may often be demonstrated in the urine of individuals tuberculous in some other portion of the body. Aside from general miliary tuberculosis, the kidneys are said to become diseased in from five to ten per cent of tuberculosis cases; that is to say, they are infected comparatively early, so that definite microscopic kidney lesions are found at autopsy. Probably in most cases the bony or respiratory systems are the centers from which the blood carries the bacilli to find lodgment in the kidneys, it being now believed that so called primary urogenital tuberculosis is rare.

From a more careful clinical study with the better instruments now possessed, the blood stream is

\* Read before the Alameda County Medical Society.

acknowledged to be the real source of infection in renal and genital cases, aside from such sources as direct contact, as in spinal caries, so that the former post-mortem conclusion of ascending infection has now been abandoned.

Nature has been kind even in her distribution of such a misery, as unilateral involvement is the rule for quite a while at least, and even where bilateral disease exists, nephrectomy of the side most destroyed may allow the fellow kidney to recover to an apparently normal state.

The disease in general attacks young life and the years from fifteen to thirty show the majority of this type. In sex, females have furnished slightly more of the cases reported.

Alertness on the part of the physician may discover a case early, for an irritable state of the bladder may be present even before actual lesions ensue here. The most striking features of the symptoms are the increased frequency of urination both night and day, increase in the quantity of urine, lessened bladder capacity, bladder pain that gets very distressing as ulceration increases.

The usual fever and toxic features of the tuberculous invasions are not present till comparatively late. Loss of weight and inability for sustained effort of any kind are more or less noticeable. Blood in the urine and seminal secretion may be present but does not necessarily follow, but blood elements microscopically are usually found.

The urine is pale, cloudy, acid in reaction till secondary organisms in the bladder or kidney pelvis modify to alkalinity: of low specific gravity and in quantity is generally from a third to double the normal, till such destructive loss of tissue may reduce this. Albumin is proportionate to the blood and pus present. Tissue elements can be found in the sediment. From blocking of the ureter of the diseased side, the urine may at times be quite clear and free from tissue debris. Small blood clots almost pinhead in size, or quite extensive hemorrhages, may be noticed. Later there may be fever, sweats, emaciation, a palpable kidney tumor and a most distressing bladder condition with almost continuous desire to urinate made all the more deplorable where, as in the case noted below, urethral stricture causes retention of urine.

In the genital cases the epididymis may show nodulation, later softening with abscess formation. The seminal emissions may be pus and blood stained, and if the seminal vesicles are involved, pain will likely be present at the periods of discharge. Irregular nodulations of the testicle proper, with later abscesses, is the rule here.

To have a better appreciation of the conditions that modify symptoms, let us see what are the pathological changes in the tissues. Mention has already been made that the disease begins quite regularly as a unilateral process and so remains for a considerable time. As the infection follows the blood stream, the cortical or medullary substance of the kidney shows the first small tubercles in the connective tissue near the small vessels. At this site then the small round cell growth takes place with giant cells and later caseation and liquefaction with

small or large abscess formation. The process may remain quiescent and masked for long periods, should the inflammation be confined to the cortical substance, but usually the infection spreads to the pelvis of the kidney and thus a descending inflammation follows. More or less interstitial nephritis accompanies the tubercle formation with gradual obliteration of vessels. Should the foci begin at the pyramidal papillæ, the case will be characterized by considerable hemorrhagic symptoms. Through contractures or even by clot formation and tissue debris, the ureter channel may become clogged or obliterated and a hydro or pyonephrosis ensue, with possible palpable tumor formation.

The bladder tissue at first shows a congestion and edema of the mucous membrane, especially about the ureteral papillæ. Later tubercles appear and from surface erosion ulceration and contractures follow.

The establishment of a correct etiological diagnosis is certainly a most important consideration here, and the false position that the use of such general terms as "cystitis" and "pyelitis" leads to, may well be condemned. We should not be satisfied in any urinary or genital case that shows a chronic course, to rest till our modern clinical laboratory methods have given to us the causative factor in the case, so that we may then intelligently lay out a course of treatment upon rational lines.

Should a case present itself that gives the chain of evidence mentioned in the symptoms, we can suspect tuberculosis, and then by careful urinary examination and cystoscopy fit our case to the demonstration of tubercle bacilli in the urine and make the evidence complete by showing damaged structures and the cause thereof. Masked cases are liable to confound us, and the bacilli in the urine must not lead us to say we are dealing with damage to the urinary or genital structures, for we have seen that the urine may simply act as a conveyor for such. In the differential diagnosis conditions that produce bladder or renal pain, pyuria, hematuria and renal or testicular tumor, and also increased frequency of urination must be distinguished.

Calculi may cause pain and the urine show pus and blood. Where renal the characteristic colic is frequently present periodically with nausea and vomiting. Crystals may be found in the urine suggestive of the stone and also the urine is not so markedly modified as in tubercle. The X-ray may demonstrate the calculus. Bladder stone should be easily distinguished by the cystoscope. Prostatic calculi may cause painful and frequent urination, with blood and pus associated, but there is likely to be residual urine, prostatic tenderness and enlargement shown per rectum.

Septic infection in the bladder or the renal pelvis is liable to be a more acute or subacute condition following circumstances that would be suggestive and a pyonephritis may be consecutive to some acute constitutional malady such as pneumonia or typhoid. In such cases cultures from the urine are easily produced, whereas tuberculous urine is sterile until quite late.

Malignant disease of the prostate or kidney with

purulent urine and blood and also pain would more likely show tumor formation and would lack the evidence of the tubercle bacilli.

So called essential renal hemorrhage may be confusing until careful search excludes tubercle bacilli, which should be the final link in our chain of evidence and only where their presence is demonstrated by reliable laboratory methods, excluding organisms of a similar character. As a diagnostic agent, tuberculin may aid, giving a more active local reaction.

In the genital organs nodules of the epididymis often follow gonorrheal inflammation and prostatic abscesses, early or late.

What shall be our estimate when the patient asks us can we cure him? Reports from the medical world everywhere are more optimistic in tone, so that with the proper regimen we can promise a probable cure most likely through surgical means, but possibly through medical alone.

The treatment must be considered from several viewpoints, as the removal, surgically, of the centers of infection; the increase of the powers of resistance of the organism as a whole; the use of agents to promote phagocytosis; the employment of drugs to inhibit the growth of organisms in the urinary tract; and such local measures as can be used to advantage.

Nephrectomy is recognized at the best possible measure to undertake after the satisfactory examination of the urine from each ureter is accomplished, demonstrating the presence of both organs, the side most diseased and the functional capability of the other kidney. In the case of the epididymis, castration should follow only after the testicle is shown to be diseased, following the practice of Cumston of Boston, who prefers to remove the diseased epididymis alone if justifiable.

To increase the general resistance of the patient we employ good feeding, moderate exercise, the open air life and plenty of rest, with the use of such drugs as tend to "tone" up the system, iron, nux vomica, quinin, and cod liver oil. In the last few years the use of tuberculin under the most careful observation has taken what would seem to be a permanent place in the therapy of tuberculous cases, and following out the same line of thought the joint employment of autogenous vaccines prepared from such organisms as may be secondarily engrafted upon ulcerations of the kidney, pelvis or bladder, would be rational.

Another agent that would seem to offer a most thorough trial in these cases is the intramuscular injection of mercury, for it would seem to be the "chemical opsonin" par excellence, if the term is permissible.

It has been the custom to use urotropin, salol and such other so-called urinary antiseptic drugs to as much as possible inhibit the growth of organisms, and this is surely a measure of aid.

Locally the tuberculous inflammation in the bladder may be combated by irrigation of solutions containing guaiacol, creosote, phenol and instillation of oily solution of iodoform. Silver nitrate and solutions of the bichloride or oxycyanate of mercury so

valuable with the ordinary pus cocci have been found to be too irritating in these cases.

The notes of the following cases are reported to give an illustration of the symptoms:

Case 1. J. C., male, age 16 years. Parents living and well, and also three brothers and one sister.

Two years preceding the spring of 1903 when I saw him, he had been having trouble with the bladder, and he came to me with a diagnosis of bladder and renal tuberculosis, having been examined by Dr. Chismore of San Francisco and advised that if there was any hope of a recovery it would be through non-interference medically or surgically, but rather by hygienic means.

At the time of my seeing him he presented a fairly well nourished body, but of spare build, had some cough, was languid and tired easily; had a variable temperature and had lost some weight. In the region of the right kidney there was tenderness and a sense of weight and discomfort, but the distress principally was with the bladder having pain, frequent urination, twelve to fifteen times and even more at night, and half hourly in the day, with at times difficulty in passing urine, apparently on account of clot formation obstructing the urethra. The urine was very cloudy, with a large sediment made up of pus and blood cells and frequently blood clots, was ill-smelling, alkaline in reaction, sometimes above normal in quantity, at others scanty, while clumps of tubercle bacilli could easily be demonstrated.

The scrotum on right side had several scars and the testicle here was atrophied; left side normal. Patient said that four or five years previous to the bladder trouble he had some abscesses here.

In the succeeding two years his symptoms continued to grow worse, and on a few occasions it was necessary to catheterize him to relieve retention of urine, and I found a tortuous stricture formation in the deep urethra admitting with difficulty a web catheter, No. 8 French.

No attempt at curative measures was undertaken, and on examination at Lane Hospital, operative measures were not advised. He lived on for two years from the time I saw him, and died of inanition.

Case 2. Miss A. R., age 30, school teacher, was referred to me by Dr. McCleave on account of bladder trouble that had persisted for a few months. When I saw her she had given up her teaching duties and was quite incapacitated on account of frequent urination and bladder pain, especially on walking or standing much. She had lost some in weight, but had no fever or sweats. The urine was pale, much increased in quantity, somewhat cloudy, acid or neutral in reaction, low specific gravity, a small amount of albumin and showed blood, pus cells and tissue shreds.

The cystoscopic picture showed an inflamed bladder wall with the mucous lining ragged and with some ulceration and swelling about the ureteral opening of right side, and redness and swelling about left side; no distinct jet in the delivery of urine.

The bladder capacity was about six ounces, and even this quantity caused discomfort. I was not satisfied with my own microscopic examination of the urine for organisms, so sent Dr. Nusbaumer some specimens. Nothing definite was reported from a catheterized specimen, but from the 24-hour quantity a positive demonstration of tubercle bacilli was made.

As the clinical symptoms agreed with this finding, and as the urine gave evidence of destructive action going on in the kidneys, and the bladder showed centering of the inflammation about the ureteral openings, the diagnosis of kidney tuberculosis with complications of the bladder was made, though no other foci could be demonstrated outside of the urinary organs.

The patient was placed upon a general tonic course of treatment, advised to live in the open and remain quiet as long as the bladder gave distress.

Intramuscular injections of a soluble mercury preparation were given, alternating with the administration of sodium iodide. Locally bladder irrigations of a one-half per cent solution of phenol were used, alternating with instillations of iodoform in olive oil. Use was also made of either urotropin or salol.

There was an improvement from the start, and at the end of six months the bladder ulceration was healed and comparative comfort established. The urine quantity was also quite normal and with better color, specific gravity, and very little organic sediment.

Tuberculin injections were then begun and have been continued to the present time, a period of six months. With intervening periods the mercury injections have also been continued.

At the present time the patient is progressing nicely and is practically free from all bladder symptoms. The urine is normal in quantity, being passed at intervals of two or three hours in the day and twice at night, but it still shows cellular elements in excess. She has gained about twenty pounds in weight. It is probable there will be a cure, though as yet she has not attained that desirable state.

### THE THEORY AND THE VALUE OF TUBERCULINS.\*

By EDWARD VON ADELUNG, M. D., Oakland.

In the following ten-minute paper, although I shall discuss cursorily the theory of the action of tuberculins and their value in diagnosis and treatment, I shall have to omit discussion of dosage, intervals between doses, indications and contra-indications, and the other therapeutic details, because that subject would include so many particulars, all of which are important, that it cannot be dealt with except at length.

When the human organism is the subject of certain infections such as diphtheria, we have a localized process which generates toxins which circulate in the blood-stream. The fever, weakness, depression, paralysis, and other general symptoms are the expression of the toxemia. The injection of the specific antitoxin neutralizes the toxin, the symptoms disappear, and the patient gets well.

When the human organism is the subject of certain other infections, notably tuberculosis, the case is quite different; here we have notable differences. The diphtheria antitoxin is soluble in blood; the tubercular antitoxin is insoluble in blood, and therefore impracticable. The pathological process too is different: instead of fighting in the open, the enemy attacks from a fortified position. The invading organism is enclosed within the firm walls of a tubercle. In tuberculosis this investing barrier prevents more or less successfully both egress and ingress—the egress of the bacilli and their products; the ingress of antitoxic and bacteriolytic agents.

This condition of affairs, it is readily seen, hinders the system generally from earning its immunity, for only those cells directly concerned with the tubercle formation are in a position to receive the necessary stimuli that develop immunity. It is further conceived that later, in unfavorable cases

when the defensive wall fails to perform its protective function, the tissue cells of the whole body are subjected to such doses of tubercular toxins and at such unfavorable times, that they are overwhelmed instead of immunized. Baldwin puts it in these words: "The tissues in general experience but slight effect from the presence of a few tubercle bacilli well localized, and there results a lack of effective resistance from absence of a general stimulus at favorable moments in most cases of chronic tuberculosis. The ultimate result consequently often depends on the efficiency of the cell nutrition throughout the body to bear repeated severe exposures without harm." This is evidenced by the state of affairs observed in those cases of immunity resulting from a previous attack of tuberculosis—cases that we refer to as arrested. Such persons frequently continue the subjects of secondary anemia, disordered digestion, imperfect assimilation, and consequent tissue vulnerability. Such persons are liable at any time to suffer another attack.

In the presence of forces that tend toward such a predicament, and recalling the pathology of the tubercle, tuberculin offers some rational hope of escape. It does so by offering an artificial means for immunization of the general tissue cells, those not directly concerned in the tubercle formation. This procedure, as at present practiced, is not absolute in its results, is explained by theories and not by known processes, is open to the criticism of exact science to some extent, and yet has a definite valued place in scientific medicine.

Some have turned to sero-therapy, convinced that tuberculosis is to be conquered with the same weapons that controlled diphtheria. And although the acumen of such men as Trudeau, Baldwin and notably Maragliano has been brought to bear on the problem, nothing convincing has thus far been presented. Organotherapy likewise has failed.

The fact seems to be fairly clear, that in order to fight the tubercle bacillus successfully by artificial immunization, it is necessary to employ not only a stimulus to the formation of antitoxins, but stimulants to the bacteriolytic and phagocytic functions as well. In searching for such agents we naturally turn to the tubercle bacillus itself, for it stands to reason that they must be found within the specific bacillus and its products.

But since these various elements have thus far escaped the scrutiny of the laboratory analyst, since they have not yet been differentiated, we are still unable to choose those parts of the bacillus and of its products that are the essential immunizing elements. Is it the proteids? Is it the waxy coat that envelopes the bacillus and renders it acid-fast? Is it a carbohydrate? Is it the nucleic acid or one of its compounds? Or is it one of the many products resulting from the decomposition of the bacilli? As yet, no one can answer.

Hence in the manufacture of tuberculin, many methods have been followed, according to the various theories of the producers. The many tuberculins that have been offered the profession may be divided into two kinds: those that do not contain insoluble elements, and those that do contain insol-

\* Read before the Alameda County Medical Society.